

Ontario's Air Quality Index

The Air Quality Index (AQI), introduced in 1988, currently measures and reports on five key urban air pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), ozone (O₃), and fine particulate matter (PM2.5). In communities where odours may be an issue, total reduced sulphur (TRS) compounds are also measured and reported. Improvements to the AQI were made in August 2002, when Ontario added PM2.5 to its AQI – the first Canadian province to do so.

This brochure explains what these pollutants are, where they come from, and what effects they may have on the environment and on human health.

The Ontario government's automatic air monitoring stations constantly analyze the quality of our air. The data results are translated into an AQI value that helps Ontarians understand the level of air pollution. AQI values are posted on the Ministry of the Environment's air quality Web site at www.airqualityontario.com, and are often reported by Ontario media outlets.

What is a Smog Advisory?

The Ontario Ministry of the Environment issues smog advisories when widespread, elevated and persistent smog levels are forecast due to elevated ground-level ozone and/or fine particulate matter. During an advisory, Ontarians are encouraged to limit activities which contribute to air pollution, such as unnecessary trips in the car, using their gas-powered lawn mowers, etc. People with respiratory and heart problems are also encouraged to limit their outdoor activities, if necessary.

Ontario has a two-tiered smog alert program: A **Smog Watch (introduced in 2000) is issued when widespread elevated smog is forecast within the next three days. A **Smog Advisory** is issued when widespread elevated smog is likely to occur within 24 hours.*

Air Quality Index Pollutants and Their Impacts

Index	Carbon Monoxide (CO)	Nitrogen Dioxide (NO ₂)	Ozone (O ₃)	Sulphur Dioxide (SO ₂)	Fine Particulate Matter (PM2.5)	Total Reduced Sulphur (TRS) Compounds
0-15	No known harmful effects	No known harmful effects	No known harmful effects	No known harmful effects	Sensitive populations may want to exercise caution	No known harmful effects
16-31	No known harmful effects	Slight odour	No known harmful effects	Damages some vegetation in combination with ozone	Sensitive populations may want to exercise caution	Slight odour
32-49	Blood chemistry changes, but no noticeable impairment	Odour	Respiratory irritation in sensitive people during vigorous exercise; people with heart/lung disorders at some risk; damage to very sensitive plants	Damages some vegetation	People with respiratory disease at some risk	Odour
50-89	Increased symptoms in smokers with heart disease	Air smells and looks brown; some increase in bronchial reactivity in asthmatics	Sensitive people may experience irritation when breathing and possible lung damage when physically active; people with heart/lung disorders at greater risk; damage to some plants	Odour; increasing vegetation damage	People with respiratory disease should limit prolonged exertion; general population at some risk	Strong odour
100 and over	Increasing symptoms in non-smokers with heart disease; blurred vision; some clumsiness	Increasing sensitivity for asthmatics and people with bronchitis	Serious respiratory effects, even during light physical activity; people with heart/lung disorders at high risk; more vegetation damage	Increasing sensitivity for asthmatics and people with bronchitis	Serious respiratory effects even during light physical activity; people with heart disease, the elderly and children at high risk; increased risk for general population	Severe odour; some people may experience nausea and headaches

Sulphur Dioxide SO_2

SO_2 is a colourless gas that smells like burnt matches. Smelters and utilities (especially electricity generation) are primary sources of SO_2 . Other industrial sources include iron and steel mills, petroleum refineries, and pulp and paper mills. Health effects caused by exposure to high levels of SO_2 include breathing problems, respiratory illness, changes in the lung's defenses, and worsening respiratory and cardiovascular disease. People with asthma or chronic lung or heart disease are the most sensitive to SO_2 . The pollutant also damages trees and crops. SO_2 , along with nitrogen oxides, are the main precursors of acid rain, a phenomenon that contributes to the acidification of lakes and streams and the accelerated corrosion of buildings.

Fine Particulate Matter $\text{PM}_{2.5}$

Particulate matter is the umbrella term used for a mixture of solid particles and liquid droplets in the air. This includes aerosols, smoke, fumes, dust, ash and pollen. Fine particulate matter ($\text{PM}_{2.5}$) is particulate matter that is 2.5 microns and less in diameter. It is also known as respirable particulate matter, because it penetrates the respiratory system further than larger particles. People with asthma, cardiovascular or lung disease, as well as children and elderly people, are considered to be the most sensitive to the effects of fine particulate matter. $\text{PM}_{2.5}$ is also responsible for environmental impacts such as corrosion, soiling, damage to vegetation and reduced visibility.

Total Reduced Sulphur TRS

TRS compounds produce offensive odours similar to rotten eggs or cabbage. Industrial sources of TRS include the steel industry, pulp and paper mills, refineries and sewage treatment facilities. Natural sources include swamps, bogs and marshes. TRS compounds are not normally considered a health hazard. Some people may experience nausea or headaches being exposed to very high TRS concentrations.

Carbon Monoxide CO

Automobile emissions are the primary source of this colourless, odourless, tasteless gas. CO enters the bloodstream and reduces oxygen delivery to the organs and tissues. People with heart disease are particularly sensitive. Exposure to high levels is linked with impairment of vision, work capacity, learning ability and performance of difficult tasks.

Nitrogen Dioxide NO_2

NO_2 is a reddish-brown gas with a pungent and irritating odour. All hydrocarbon combustion in air produces oxides of nitrogen (NO_x), of which NO_2 is a major product. NO_2 can irritate the lungs and lower resistance to respiratory infection. Sensitivity increases for people with asthma and bronchitis. NO_2 chemically transforms into nitric acid and, when deposited, contributes to lake acidification. Nitric acid can also corrode metals, fade fabrics, degrade rubber, and cause substantial damage to trees and crops.

Ozone O_3

O_3 is a colourless, odourless gas and a major component of smog. Ground-level ozone is not emitted directly into the atmosphere. It results from photochemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. O_3 irritates the respiratory tract and eyes. Exposure to high levels of O_3 results in chest tightness, coughing and wheezing. People with respiratory and heart problems are at higher risk. O_3 causes agricultural crop loss and noticeable leaf damage in many crops, garden plants and trees.

Note: Ground-level ozone (O_3) should not be confused with stratospheric ozone. Ozone in the stratosphere (15 to 50 km above the Earth's surface) is naturally created and screens us from harmful ultraviolet radiation. Ground-level ozone (described above) is harmful to plants, animals, and humans.

The Ministry of the Environment (MOE) provides daily AQI readings and smog forecasts for areas across Ontario on the Web site www.airqualityontario.com

Daily AQI values are also available

from the MOE by calling

416-246-0411

in Toronto or toll-free at

1-800-387-7768 (English)

or

1-800-221-8852 (French)

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Ontarians want and deserve clean air and healthy communities. This is why air quality in the province is constantly being monitored.

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